

**Louisiana Department of Environmental Quality (LDEQ)  
Office of Environmental Services**

**STATEMENT OF BASIS**

**DOW CHEMICAL CO.  
PLAQUEMINE COGENERATION PLANT  
Plaquemine, Iberville Parish, Louisiana  
Agency Interest Number: 85652  
Activity Number: PER20060002  
Proposed Permit Number: 1280-00096-V2**

**I. APPLICANT**

**Company:**

The Dow Chemical Co - Plaquemine Cogeneration Plant  
PO Box 150  
Plaquemine, Louisiana 70765

**Facility:**

Dow Chemical Co- Plaquemine Cogeneration Plant  
21255 Hwy 1  
Plaquemine, Iberville Parish, Louisiana  
Approximate UTM coordinates are 669.89 kilometers East and 3353.17 kilometers North, Zone 15

**II. FACILITY AND CURRENT PERMIT STATUS**

The Dow Chemical Company's Plaquemine Cogeneration Plant, is an existing electric and steam utility cogeneration facility. American Electric Power's (AEP) Ventures Lease Co. was the former owner and operator before the facility recently changed ownership on November 30, 2006. The facility also became contiguous upon the change in ownership with The Dow Chemical Company's Louisiana Division, Agency Interest No. 1409. The Dow Chemical Company's Plaquemine Cogeneration Plant currently operates under Permit No. 1280-00096-V1, issued October 3, 2003 and administratively amended March 21, 2005 and June 13, 2006.

The Plaquemine Cogeneration Plant is a designated Part 70 source. Prevention of Significant Deterioration (PSD), and Acid Rain (Title IV) permits have also been issued to the operating units within the facility. These include:

<b>Permit No.</b>	<b>Unit or Source</b>	<b>Date Issued</b>
1280-00096-V1		June 13, 2006
	GT-500 Gas Turbine - HRSG Train with Duct Burner	
	GT-600 Gas Turbine - HRSG Train with Duct Burner	
	GT-700 Gas Turbine - HRSG Train with Duct Burner	
	GT-800 Gas Turbine - HRSG Train with Duct Burner	
1280-00096-IV1	Entire Facility	April 5, 2004
PSD-LA-659(M-1)	Entire Facility	Nov. 3, 2003

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An application for a renewal Part 70 permit and Title IV addressing the facility is still under review by the department. This application included the following sources:

Permit No.	Unit or Source
1280-00096-V2	
	GT-500 Gas Turbine
	GT-600 Gas Turbine
	GT-700 Gas Turbine
	GT-800 Gas Turbine
	HRSG Duct Burner for GT-500
	HRSG Duct Burner for GT-600
	HRSG Duct Burner for GT-700
	HRSG Duct Burner for GT-800
	CT-1 Cooling Tower
	F-1 Fugitive Emissions

### III. PROPOSED PROJECT/PERMIT INFORMATION

#### Application

A permit renewal application was submitted on June 6, 2006, requesting a Part 70 operating permit renewal for the Plaquemine Cogeneration Plant. The application was subsequently revised. Additional information dated August 21, 2006, May 11, 2007, June 15, 2007, August 15, 2007, and November 29, 2007, was also submitted.

A permit application was submitted on June 28, 2007, requesting an initial Clean Air Interstate Rule (CAIR) permit. Additional information dated August 15, 2007, was also submitted.

#### Project

There is no project associated with this permit application.

#### Proposed Permit

Permit 1280-00096-V2 will be the renewal of the Part 70 operating permit for the Plaquemine Cogeneration Plant.

The Dow Chemical Company's Plaquemine Cogeneration Plant generates electrical power through the operation of four natural gas fired GE Frame 7 FA combustion turbines (Source ID Nos. GT-500, GT-600, GT-700 and GT-800). Each turbine has a nominal power rating of 170 MW and typical operational heat input of 1,758

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MMBtu/hr-HHV (higher heating value) combusted natural gas. A higher firing rate of approximately 1,894 MMBtu/hr-HHV is utilized when performing steam injection during peak operations. The maximum firing rate of 1,931 MMBtu/hr-HHV occurs during cold weather operations.

The turbines are equipped with dry low NO<sub>x</sub> combustors capable of achieving a NO<sub>x</sub> concentration of 9 ppmvd (parts per million, volumetric dry) @ 15% O<sub>2</sub> at the exhaust during non-peaking operations. Steam injection is not used by the facility as a method of NO<sub>x</sub> control.

Following each turbine is a HRSG (Heat Recovery Steam Generator) with a supplementally-fired duct burner system capable of firing pure natural gas, plant produced fuel gas between 0-60% hydrogen with a balance of methane provided by a host facility, and/or a pure stream of hydrogen gas provided by a host facility. Each duct burner system is equipped with two separate sets of duct burners. One set of burners exclusively fires the pure hydrogen fuel stream and the second set of burners fires plant produced fuel gas, natural gas, or a blend of plant produced fuel gas and natural gas.

The maximum firing rate for each duct burner system is 945 MMBtu/hr-HHV achieved during maximum hydrogen fuel consumption where each burner system burns 673 MMBtu/hr-HHV of plant produced fuel gas containing 60% hydrogen, and 272 MMBtu/hr-HHV of pure hydrogen.

In addition to combustion control technologies, each gas turbine/duct burner unit is equipped with a Selective Catalytic Reduction (SCR) unit which is capable of achieving a NO<sub>x</sub> concentration of 5 ppmvd @ 15% O<sub>2</sub> at the stack exhaust, on an annual average. Anhydrous ammonia is injected into the SCR unit to react with NO<sub>x</sub>, and the ammonia concentration (ammonia slip) may reach levels of 10 ppmvd @ 15% O<sub>2</sub>. This accounts for the ammonia emissions from the facility. The ammonia is stored on-site in a pressurized vessel.

The proposed PSD permit modification, PSD-LA-659(M-2), proposes to modify the nitrogen oxides (NO<sub>x</sub>) limitation to allow the facility adequate time to make adjustments to the gas turbines (RLP 18 – RLP 21) rather than have to shut them down to avoid an exceedance. As a result of these frequent shutdowns, Plaquemine Cogeneration Plant does not have enough CEMS data to justify a more appropriate NO<sub>x</sub> BACT limitation during normal operations. Therefore, the proposed permit allows a higher NO<sub>x</sub> BACT maximum pounds per hour limitation to allow for adequate time to make process adjustments to the equipment. In addition, the proposed permit requires Plaquemine Cogeneration Plant to collect continuous emissions data for a period of twelve (12) months and then submit a copy of the of the CEMS data to LDEQ. Upon review of the information submitted, LDEQ will make a determination regarding whether or not Plaquemine Cogeneration Plant must submit a permit modification application in order to incorporate this data into the permit. If a permit modification is determined to be appropriate, LDEQ will respond in writing indicating a deadline by which Plaquemine Cogeneration Plant shall be required to submit a permit modification application. The NO<sub>x</sub> BACT limit of 5 ppmvd @ 15% oxygen will not change as a result.

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Each combustion turbine stack is equipped with a Continuous Emissions Monitor (CEMS) for NO<sub>x</sub> and CO<sub>2</sub> emissions to ensure compliance with air emission limits as required.

The main function of each turbine is to produce shaft power to drive an electric generator. Combustion air and natural gas are burned producing high-velocity combustion discharge that impinges on the turbine blades rotating the turbine shaft. The exhaust gas exits the gas turbine and is routed to the HRSGs for steam production. The mechanical energy produced by the turbine is used to drive the electric generator and compress the incoming combustion air. Higher efficiency is also attained using evaporative cooling to increase density of the incoming combustion air.

All turbines located at the Plaquemine Cogeneration Plant are subject to 40 CFR 63, Subpart YYYY – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Combustion Turbines. Because the turbines were constructed prior to January 14, 2003, they do not presently have to meet the requirements of 40 CFR 63, Subpart YYYY unless reconstructed or replaced. The HRSGs use the hot combustion gas exiting from the turbines to produce steam. Non-contact heating of the boiler feed water produces steam. Each HRSG is supplied with supplementary firing duct burners to increase the steam production as required.

With this modification, Dow Chemical Company proposes to:

- Incorporate startup and shutdown emissions for the Gas Turbine-HRSG trains (RLP 18 – RLP 21)
- Revise the NO<sub>x</sub> maximum pound per hour emission limitation that applies during normal operations for each of the Gas Turbine-HRSG trains (RLP 18 – RLP 21) in order to address the averaging period differences between this limitation and the 5 ppmvd @ 15% oxygen limitation, which applies on an annual average basis
- Remove the separate BACT limitations that apply to the HRSG portion (EQT 12 – EQT 15) of the Gas Turbine-HRSG trains. These sources can not operate without the support of the Gas Turbines (EQT 6 – EQT 9), and as a result it is not necessary to have separate BACT limitations for them.

The changes to the BACT requirements for this facility do not reflect a physical change or change in the method of operation.

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**Permitted Air Emissions**

Estimated emissions in tons per year are as follows:

<u>Pollutant</u>	<u>Before</u>	<u>After</u>	<u>Change</u>
PM <sub>10</sub>	559.40	559.40	-
SO <sub>2</sub>	214.80	214.80	-
NO <sub>x</sub>	854.40	854.40	-
CO	2503.20	2503.20	-
VOC	43.00	48.16	+ 5.16

**LAC 33:III Chapter 51 Toxic Air Pollutants (TAPs):**

<u>Pollutant</u>	<u>Before</u>	<u>After</u>	<u>Change</u>
Ammonia*	631.60	631.60	-
Formaldehyde	5.80	5.80	-
Sulfuric Acid*	2.00	2.00	-
Total	639.30	639.30	-
VOC TAPs	5.80	5.80	-
*Non-VOC TAPs	633.50	633.50	-

**IV REGULATORY ANALYSIS**

The applicability of the appropriate regulations is straightforward and provided in the Specific Requirements section of the proposed permit. Similarly, the Monitoring, Reporting and Recordkeeping necessary to demonstrate compliance with the applicable terms, conditions and standards are also provided in the Specific Requirements section of the proposed permit.

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**Non-Applicability and Exemptions of Selected Subject Items**

<b>XI. Table 2. Explanation for Exemption Status or Non-Applicability of a Source</b>		
<b>ID No:</b>	<b>Requirement</b>	<b>Notes</b>
Gas Turbines GT-500-GT 800 Duct Burners DB-500-DB- 800	Control of Emissions of Nitrogen Oxides [LAC 33.III.2201]	EXEMPT. Sources are subject to a more stringent state or federal NOx emission limitation. [LAC 33.III.2201.C.15]
	Comprehensive Toxic Air Pollutant Emission Control Program [LAC 33.III.Chapter 51]	EXEMPT. Emissions from the combustion of Group 1 virgin fossil fuels are exempt. [LAC 33.III.5105.B.3.a]
Entire Facility	NESHAP – National Emission Standards for Hazardous Air Pollutants for Source Categories. [40 CFR 63 Subpart A]	DOES NOT APPLY. Emissions of Hazardous Air Pollutants are < 1 TPY. Facility is not a major source of Hazardous Air Pollutants.
	NESHAP – National Emission Standards for Hazardous Air Pollutants – Requirements for Control Technology Determinations for Major Sources in Accordance with Clean Air Act Sections 112(G) and 112(J). [40 CFR 63 Subpart B]	DOES NOT APPLY. Emissions of Hazardous Air Pollutants are < 1 TPY. Facility is not a major source of Hazardous Air Pollutants.
	CAM - Compliance Assurance Monitoring. [40 CFR 64]	EXEMPT. Sources covered under the Acid Rain Program are exempt from CAM. [40 CFR 64.2(b)(iii)]
	NNSR - Nonattainment New Source Review. [LAC 33:III.504]	DOES NOT APPLY. Facility-wide Volatile Organic Compound (VOC) emissions do not exceed the major source threshold. [LAC 33:III.504.A]
Gas Turbines GT-500-GT 800	Standards of Performance for Stationary Combustion Turbines [40 CFR 60 Subpart KKKK]	DOES NOT APPLY. Turbines were constructed prior to February 18, 2005.

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<b>ID No:</b>	<b>Requirement</b>	<b>Notes</b>
Gas Turbines GT-500-GT 800 (cont.)	NESHAP - National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines [40 CFR 63 Subpart YYYYY]	DOES NOT APPLY. Turbines that were constructed or last modified prior to January 14, 2003 do not have to comply with any requirements of this subpart. [40 CFR 63.6090(a)(4)]
Fugitive Emissions F-1	Control of Emission of Organic Compounds. [LAC 33:III.2122]	DOES NOT APPLY. The facility is not a listed source category covered under this regulation. [LAC 33:III.2122.A.1]
Cooling Tower CT-1	NESHAP - National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers. [40 CFR 63 Subpart Q]	DOES NOT APPLY. This facility does not use chromium based additives. [40 CFR 63.400(a)]

**Prevention of Significant Deterioration/Nonattainment Review**

The Plaquemine Cogeneration Plant proposes no physical changes or modifications to the electrical power generation plant that would cause a triggering of Prevention of Significant Deterioration analysis. The proposed PSD permit modification, PSD-LA-659(M-2), proposes to modify the nitrogen oxides (NOx) limitation to allow the facility adequate time to make adjustments to the gas turbines (RLP 18 – RLP 21) rather than have to shut them down to avoid an exceedance.

This permit was reviewed for compliance with 40 CFR 70, New Source Performance Standards (NSPS), and the Louisiana Air Quality Regulations. National Emission Standards for Hazardous Air Pollutants (NESHAP) do not apply.

**Streamlined Equipment Leak Monitoring Program**

The Dow Chemical Company's Plaquemine Cogeneration Plant has no streamlined equipment monitored.

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**MACT Requirements**

The Plaquemine Cogeneration Plant is subject to LAC 33:III.Chapter 51 as a major source of Toxic Air Pollutants (TAPs). Because the facility is not a major source of Hazardous Air Pollutants (HAPs), it is not subject to federal major source MACT standards.

The Plaquemine Cogeneration Plant is a major source of toxic air pollutants (TAPs) pursuant to LAC 33:III.Chapter 51. However, emissions from the combustion of Group I virgin fossil fuels are exempt per LAC 33:III.5105.B.3.a. Emissions of Ammonia (Class III) do not result from the combustion of any virgin fossil fuels and are subject to the recordkeeping and reporting requirements of LAC 33:III.Chapter 51. Maximum Achievable Control Technology (MACT) is not required for emissions of Class III TAPs.

**Air Quality Analysis**

No National Ambient Air Quality Standards (NAAQS) air modeling was performed in support of the proposed permit modification.

**General Condition XVII Activities**

The facility will comply with the applicable General Condition XVII Activities emissions as required by the operating permit rule. However, General Condition XVII Activities are not subject to testing, monitoring, reporting or recordkeeping requirements. For a list of approved General Condition XVII Activities, refer to the Section VIII – General Condition XVII Activities of the proposed permit.

**Insignificant Activities**

ID No.:	Description	Insignificant Activity per
-	Lube Oil Storage Tank < 0.5 psia.	LAC 33:III.501.B.5.A.3
IA-1	Analyzer Vent	LAC 33:III.501.B.5.A.9
IA-2	Lab Hood	LAC 33:III.501.B.5.A.6
-	Pressurized Ammonia Storage Tank	LAC 33:III.501.B.5.D

**V. PERMIT SHIELD**

An application requesting a permit shield in accordance with LAC 33:III.507.I was not submitted.

**VI. PERIODIC MONITORING**



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The combined Nitrogen Oxide and Carbon Dioxide emissions from each gas turbine and its attached duct burner are monitored on a continuous basis with a Continuous Emissions Monitoring System (CEMS) in order to show compliance with 40 CFR 60 Subpart Da and the Acid Rain Program.

Opacity from the gas turbines and duct burners is monitored on a weekly basis via visual inspection. If visible emissions are detected, the permittee performs an EPA Reference Method 9 test within three (3) working days. Records of all emissions checks and their results are kept on site.

Permit No. PSD-LA-659(M-1) required a performance test be conducted on the gas turbines and the duct burners in order to verify compliance with the limitations shown in that permit. This test was performed on January 19-27, 2004. Because the condition has been satisfied, it has been removed from the draft permit.

40 CFR 60 Subpart Da requires an initial performance test be conducted on the gas turbines and duct burners in order to verify compliance with the limitations imposed by this regulation. This test was performed on January 19-27, 2004. Because the condition has been satisfied, it has been removed from the draft permit.

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## **VII. GLOSSARY**

Carbon Monoxide (CO) – A colorless, odorless gas, which is an oxide of carbon.

Maximum Achievable Control Technology (MACT) – The maximum degree of reduction in emissions of each air pollutant subject to LAC 33:III.Chapter 51 (including a prohibition on such emissions, where achievable) that the administrative authority, upon review of submitted MACT compliance plans and other relevant information and taking into consideration the cost of achieving such emission reduction, as well as any non-air-quality health and environmental impacts and energy requirements, determines is achievable through application of measures, processes, methods, systems, or techniques.

Hydrogen Sulfide (H<sub>2</sub>S) – A colorless inflammable gas having the characteristic odor of rotten eggs, and found in many mineral springs. It is produced by the reaction of acids on metallic sulfides, and is an important chemical reagent.

New Source Review (NSR) – A preconstruction review and permitting program applicable to new or modified major stationary sources of air pollutants regulated under the Clean Air Act (CAA). NSR is required by Parts C ("Prevention of Significant Deterioration of Air Quality") and D ("Nonattainment New Source Review").

Nitrogen Oxides (NO<sub>x</sub>) – Compounds whose molecules consist of nitrogen and oxygen.

Organic Compound – Any compound of carbon and another element. Examples: Methane (CH<sub>4</sub>), Ethane (C<sub>2</sub>H<sub>6</sub>), Carbon Disulfide (CS<sub>2</sub>)

Part 70 Operating Permit – Also referred to as a Title V permit, required for major sources as defined in 40 CFR 70 and LAC 33:III.507. Major sources include, but are not limited to, sources which have the potential to emit:  $\geq 10$  tons per year of any toxic air pollutant;  $\geq 25$  tons of total toxic air pollutants; and  $\geq 100$  tons per year of regulated pollutants (unless regulated solely under 112(r) of the Clean Air Act) (25 tons per year for sources in non-attainment parishes).

PM<sub>10</sub> – Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers as measured by the method in Title 40, Code of Federal Regulations, Part 50, Appendix J.

Potential to Emit (PTE) – The maximum capacity of a stationary source to emit any air pollutant under its physical and operational design.

Prevention of Significant Deterioration (PSD) – A New Source Review permitting program for major sources in geographic areas that meet the National Ambient

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Air Quality Standards (NAAQS) at 40 CFR Part 50. PSD requirements are designed to ensure that the air quality in attainment areas will not degrade.

Sulfur Dioxide ( $\text{SO}_2$ ) – An oxide of sulfur.

Sulfuric Acid ( $\text{H}_2\text{SO}_4$ ) – A highly corrosive, dense oily liquid. It is a regulated toxic air pollutant under LAC 33:III.Chapter 51.

Title V Permit – See Part 70 Operating Permit.

Volatile Organic Compound (VOC) – Any organic compound, which participates in atmospheric photochemical reactions; that is, any organic compound other than those, which the administrator of the U.S. Environmental Protection Agency designates as having negligible photochemical reactivity.